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TAIWAN'S

AGRICULTURAL GROWTH DURING THE 1970'S

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Supply, Demand, and Trade Projections for Selected Agricultural Projects

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ABSTRACT

Despite the projected decline in Taiwan's population growth rate, rising per capita incomes and rapid urbanization will greatly increase per capita consumption of most foods and change consumption patterns in favor of high-protein products versus the traditional rice and sweetpotatoes. Taiwan, one of the largest exporters of agricultural commodities in the Far East, is experiencing a significant rise in agricultural imports. Projections show the uptrend in exports weakening as import requirements continue to increase. The country's current pattern of trade diversification is projected to continue, resulting in the U.S. loss of much of its share of Taiwan's imports and exports of agricultural products. In absolute quantity terms, however, market opportunities for U.S. agricultural exports to Taiwan will remain strong, although encountering increasing competition.

Keywords: Taiwan, projections, population, income production, demand, trade, trade diversification, U.S.-Taiwan trade.

PREFACE

This report summarizes the major findings of a comprehensive research document, "Long-term Projections of Supply, Demand and Trade for Selected Agricultural Products in Taiwan." It also presents a brief, independent analysis of these findings and sets forth implications for Taiwan-U.S. agricultural trade.

The original study was made by the Research Institute of Agricultural Economics, College of Agriculture, National Taiwan University, Taipei, Republic of China, under the direction of Professor Te Tsui Chang. It was sponsored by the U.S. Department of Agriculture under a contract with the National Taiwan University.

The main objective of the study was to obtain projections of Taiwan's production, demand for, and trade of selected agricultural products. Findings in the original study are those of the contractor and do not necessarily coincide with views of the U.S. Department of Agriculture.

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SUMMARY

Projections indicate that rising incomes and rapid urbanization in Taiwan will greatly increase per capita consumption of most foods and change consumption patterns away from the traditional starchy staples (rice and sweetpotatoes) in favor of high-protein products.

During the past 25 years, Taiwan's economy has moved from near-bankruptcy and dependency on foreign imports to a viable, developing enterprise. To meet changing economic requirements, trade and agriculture have been diversified. Taiwan, one of the largest exporters of agricultural commodities in the Far East, is also increasing its agricultural imports. Projections show the uptrend in exports weakening as import requirements grow.

To retain the increasingly important Taiwan market, the United States will have to intensify its trade efforts, adjusting to the changing needs of a rapidly developing country.

Aggregate demand for corn, milk products, and eggs is projected to more than triple 1968 levels by 1980. Demand for poultry products, soybeans, oranges, and onions will more than double. But while demand for wheat, peanuts, sugar, pork, and tobacco is projected to advance by over 60 percent, that for other commodities will fall below 1968 levels. However, the rate of increase in agricultural production is expected to slacken because of limited land and foreign export markets. Production expansion will have to rely heavily on increases in the productivity of labor and capital as well as on higher yields per land unit.

Taiwan is projected to continue trading its traditional agricultural products, although the relative levels and composition may change. The projected drop in exports of rice and sugar will be more than compensated by increased exports of fruits vegetables, animal products, and cotton goods. Among imports, increases in animal feeds top the list--followed by milk products, wheat, and cotton. While imports of tallow are projected to fall, peanuts will be a new import requirement.

Taiwan's projected rapid economic development and resulting shifts in the value, composition, and directional flows of its external trade have implications for future U.S.-Taiwan trade patterns. This is especially true for agricultural trade in which the United States has had a dominant though diminishing role in terms of percentage share of the Taiwan market. The weakening U.S. position is particularly evident in the case of Taiwan's imports of U.S. cereals, tobacco, and cotton (accounting for the bulk of U.S. exports to Taiwan). The decreasing U.S. role in the trade of selected agricultural products is expected to continue over the projected period. This appears most likely for U.S. exports of wheat, tobacco, and dairy products, and for U.S. imports of canned pineapples and mushrooms--providing the projected increases in Taiwan's trade in these commodities materialize. Total U.S. corn and soybean exports to Taiwan are expected to rise but their percentage shares of the island's market may well weaken under competition from other grain exporters as Taiwan continues to diversify its trade posture.

TAIWAN'S AGRICULTURAL GROWTH DURING THE 1970's

Supply, Demand, and Trade Projections for Selected Agricultural Products

by

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INTRODUCTION

Since the establishment of the Government of the Republic of China in Taipei, Taiwan, in January 1949, the island has risen from near bankruptcy, with an urgent need for food assistance and dim prospects for agricultural self-sufficiency, to a period of rapid growth in nearly all sectors of its economy. Taiwan's economy has undergone a transition from one characterized by dependency on U.S. economic assistance to a diversified, increasingly viable enterprise. Progress in agricultural production has made possible the transfer of large amounts of capital and labor from agriculture to other economic sectors, contributing to growth in all parts of the economy. As a result, the agricultural share of the GNP decreased from 36 percent in 1952 to 21 percent in 1969. During the same period, the share of industry increased from 18 to 32 percent.

Land reform and private and government incentives, as well as U.S. economic assistance, have been key factors in the successful economic development of Taiwan. Rural progress can be attributed to improved management and credit arrangements, and the increased use of fertilizers, better seeds, water conservation, and pest and disease control.

Increased domestic production supplemented with rapidly rising imports have placed the Taiwanese among the highest consumers in Asia. The average daily per capita energy intake is currently 2,500 calories, compared with 2,000 in 1948. Principal agricultural imports include wheat, soybeans, corn, raw cotton, milk powder, and leaf tobacco. With the exception of corn and milk powder, the bulk of these imports come from the United States.

Taiwan's external trade has a key role in economic development. Although industrial products now dominate external trade, agricultural trade has advanced significantly in absolute terms. Increased and diversified agricultural exports account for the favorable balance in external agricultural trade. Major agricultural exports were limited to two products (sugar and rice) in 1952, but now include canned mushrooms, pineapples, asparagus, tea, citronella oil, and fresh fruits and vegetables. These products accounted for over 90 percent of total agricultural exports in 1968. Japan, the United States, West Germany, South Vietnam, and South Korea are important importers of Taiwan's agricultural products. Principal farm products moving to the United States are sugar, canned mushrooms, pineapples, and asparagus. Taiwan's expanding export trade has reached into U.S. domestic markets and increasingly competed with U.S. exports. The major U.S. markets for canned mushrooms, asparagus, and pineapples have

been affected by Taiwan's exports. Taiwan's share of Canada's mushroom imports, a major U.S. outlet, rose from zero in 1960 to over 90 percent in 1968, dropping the U.S. share from 46 to 2 percent during the same period. U.S. exports of canned asparagus to West Germany, the leading market, accounted for 84 percent of West German imports of that commodity in 1961 but less than 7 percent in 1968.

Although the United States accounts for an increasing share of Taiwan's total external trade, its percentage share of both imports and exports of agricultural products has decreased during the 1960's.

Over the projected period, both rising population and greatly increased incomes will result in substantial increases in Taiwan's external trade, agricultural as well as capital and consumer goods. Although imports of agricultural products are projected to increase rapidly, the highly viable economy is projected to produce increased agricultural exports. The United States will most likely account for a significant share of this projected trade growth but its percentage share of the important cash market will probably drop as Taiwan's dynamic trade structure diversifies and expands. The extent of the U.S. percentage drop will depend on how competitive the United States remains with other foreign sources of supply.

MAJOR FINDINGS

Population

Taiwan is experiencing rapid population growth, accompanied by significant urbanization. Prior to 1960, the annual rate of natural increase was generally 3 percent and higher. However, this high rate of growth has shown a lower trend since 1961, dropping to 2.5 percent in 1968, due in part to Government efforts in promoting family planning. The growth rate is expected to fall steadily over the projected period, representing a growth of only 2 percent by 1975 and 1.8 percent by 1980 (table 1).

Table 1.--Taiwan: Population projections for 1975 and 1980 (1968 and 1970 data for comparison) 1/

Year	Total	Annual Percentage growth rate	Rural	Percentage of total	Urban	Percentage of total
1968	13,650,370	2.50	6,049,844	44.32	7,600,526	55.68
1970	14,314,842	2.36	6,186,875	43.32	8,127,967	56.68
1975	15,882,456	2.00	6,483,218	40.82	9,399,238	59.18
1980	17,438,157	1.82	6,682,242	38.32	10,755,915	61.68

1/ Reflects assumption of effective family planning. Actual data for 1968. 1970 data are estimates.

Source: Long-term Projections of Supply, Demand and Trade for Selected Agricultural Products in Taiwan, National Taiwan University, June 1970, hereafter referred to as Taiwan Long-term Projections Study.

The 1968 population of 13.6 million is projected to reach 17.4 million by 1980. Equally important is the tendency for the population to migrate to urban areas. Representing less than 56 percent of the total population in 1968, the urban population will account for nearly 62 percent by 1980.

Income

Taiwan has been experiencing rapid economic growth since the early 1950's. During the First Four-Year Economic Development Plan (1953-56), Gross National Product (GNP), in 1964 prices, increased from $1,017 million to $1,355 million, an average annual growth rate of 7.4 percent. 1/ During the Second Four-Year Plan (1957-60), real GNP rose from $1,454 to $1,779 million, an average growth rate of 7.1 percent per annum. At the end of the Third Four-Year Plan (1964), GNP increased further to $2,562 million with an average annual growth rate of 9.6 percent. The growth rate during the Fourth Four-Year Plan (1965-68) was still higher, averaging 10.5 percent per year, with real GNP reaching $3,805 million by the end of 1968.

However, it is questionable whether Taiwan's economy can indefinitely sustain these high growth rates. In its 10-year development plan, covering 1965-74, the Government has anticipated a sustained growth rate of 7 percent per annum. In the light of past development trends and existing active economic forces, this growth rate appears plausible up to 1980, and is assumed as the average, annual compound growth rate for this study.

On the above basis, the national income is projected to reach $4,695 million in 1975 and $6,585 million by 1980 (table 2).

Table 2.--Taiwan: Projections of national and per capita income for 1975 and 1980 (1968 and 1970 data for comparison) 1/

Year	National income		Per capita income	
	U.S. dollars	Annual growth rate	U.S. dollars	Annual growth rate
	Million	Percent	Actual	Percent
1968	2,886	--	206	--
1970	3,347	7.7	229	5.11
1975	4,695	7.0	290	4.94
1980	6,585	7.0	371	5.12

1/ One US$ equals about NT$40. Computed in 1964 prices.

Source: Derived from Taiwan Long-term Projections Study.

Per capita income for corresponding years is projected at $290 and $371, respectively. The annual growth rate of per capita income is expected to swing slightly downward from the level of 5.1 percent, then rise slowly and regain the 5.1 level by 1980.

Demand

Income and Price Elasticities

Income elasticities have a major impact on the projections of demand for agricultural products. Price elasticities have a lesser but significant role (table 3).

1/ All values given in US$.

Table 3.--Taiwan: Income and price elasticities of demand for selected farm products utilized in demand projections

Commodities	Income elasticity	Price elasticity
Rice		
Rural	0.04	-0.04
Urban	-0.08	1/
Sugar	0.46	-0.74
Wheat flour	0.23	-1.41
Sweetpotatoes (food)	-1.16 2/	4/
Corn	0.69 3/	4/
Pork	0.58	0.17
Milk		
Fresh	1.57	-0.92
Milk products	1.77	- .097
Soybeans		
Direct consumption	0.61 2/	0.12
Oil processing	1.16	-0.09
Peanuts		
Direct consumption	0.63 2/	0.67
Oil processing	0.28	0.26
Tobacco		
High-trade cigarettes	0.85 2/	4/
Median-grade cigarettes	-0.05 2/	4/
Low-grade cigarettes	-0.55 2/	4/

1/ Less than 0.01. 2/ Declining income elasticity for 1970. 3/ Declining income elasticity for 1975. 4/ Elasticity not derived.

Source: Taiwan Long-term Projections Study.

The effects of income on consumption varied greatly among commodities. Low and even negative income elasticities were obtained for starchy foods such as rice, wheat flour, and sweetpotatoes. Therefore, on the basis of income, per capita consumption of rice and wheat flour will increase very little in the future, while that for sweetpotatoes will actually decrease by significant amounts. However, high-income elasticities were obtained for animal products, 1.57 for fresh milk, 1.77 for milk products, and 0.58 for pork, indicating strong potential for per capita growth. The income elasticity for oilseeds varies according to end uses. For direct use, the elasticity is around 0.60 for soybeans and peanuts. For oil processing, the elasticities become 1.16 for soybeans and 0.28 for peanuts.

The income elasticity for corn used as food is probably too high. One possible cause is that most of the corn consumed is processed into various forms of food materials, the consumption of which increases as consumer income rises. Thus, the income elasticity reflects, in part, the demand for value added in processing corn into corn products. However, the income elasticity is projected to decrease sharply from 0.84 in 1970 to 0.59 in 1980. The income elasticity of demand for cigarettes varies greatly among grades. The elasticity for high-grade cigarettes is 0.85, while the elasticities for the medium and low grades are -0.05 and -0.55, respectively.

The effect of price on consumption, with other variables remaining unchanged, is measured by price elasticity. Price elasticities are shown only for those products for which demand functions were constructed in the analysis. In general, the price

elasticities are negative. However, positive price elasticities were obtained for certain products. High negative elasticities were obtained for wheat flour, fresh milk, and milk products. Low negative elasticities were observed for rice and soybeans. For rice, the price elasticity is as low as -0.04, indicating that consumption is not significantly affected by changes in price. This is quite reasonable because rice is an important staple food and its price is generally kept low relative to that of other products.

Per capita Consumption

While per capita consumption of some foods such as animal products and soybeans will rise substantially, that for other products is expected to stablize and/or drop significantly (table 4).

Per capita consumption of rice in urban areas is expected to fall while in rural communities it will increase slightly or remain nearly constant. Average per capita consumption of rice is expected to decrease. Also, the projected per capita consumption of rice is expected to decrease. Also, the projected per capita consumption of sweetpotatoes shows a sharp downtrend from 43.3 kilograms in 1968 to 15.6 kilograms by 1980. Therefore, the increase in aggregate food consumption of these two products during the projected period is the result of the increase in population, despite a decreased growth rate.

Consumption of wheat flour is projected to rise steadily. This increase is expected to result from derived demand for processed foods, in which flour is a major ingredient, and for which an increase in family income usually has been very significant.

A great increase is expected in consumption of pork and milk products. Per capita consumption of pork is estimated to increase from 23.9 kilograms in 1970 to nearly 32 kilograms in 1980, while that of milk products as a whole is expected to increase about 2.5 times between 1968 and 1980.

A substantial increase in consumption of eggs, especially chicken eggs, will occur. For poultry meats, however, the increase in per capita consumption is expected to rise less rapidly over the projected period; about 76 percent for chicken and 56 percent for duck.

Domestic consumption of sugar will increase rather steadily in the near future because of changes in Government policy, offering more sugar for sale in home markets.

Per capita consumption of oils, especially soybean, is projected to increase during this period. Uptrends are projected for fruits, particularly oranges. With the exception of onions, only a slight, if any, increase is expected in demand for vegetables.

Of the raw materials for manufacturing industries, per capita consumption of cotton will increase at a relatively slow rate, while that for tallow is expected to fall.

Aggregate Consumption

By 1980, total consumption of corn (mainly for feed), milk products, and chicken eggs is projected to more than triple 1968 levels. Consumption of chicken and duck meat, duck eggs, soybeans, oranges, and onions is projected to more than double. Use of wheat, peanuts, sugar, pork, and tobacco is projected to increase by over 60 percent. Consumption of tallow, bananas, and rapeseed oil is shown to fall below 1968 levels (table 5).

Table 4.--Taiwan: Projected per capita consumption of selected farm products for 1975 and 1980 (1968 and 1970 indices for comparison)

Commodities	1968	1970	1975	1980	1975	1980
	Kilograms				Index: (1968=100)	
Rice (brown)						
Rural	161.4	161.6	161.6	161.6	100.1	100.1
Urban	121.2	120.3	118.0	115.7	97.4	95.5
Sugar	12.7	12.5	14.4	16.8	113.4	132.3
Wheat flour	22.2	23.1	25.5	27.8	114.9	125.2
Sweetpotatoes (food)	1/ 43.3	36.6	26.3	15.6	60.7	36.0
Corn (food)	2.1	2.4	2.9	3.4	138.1	161.9
Pork	23.5	23.9	27.5	31.7	117.0	134.9
Milk and milk products	7.3	8.1	12.2	18.6	167.1	254.8
Tallow	1.7	1.4	1.2	1.1	70.6	64.7
Chicken meat	3.3	3.5	4.5	5.8	136.4	175.8
Duck meat	1.8	1.8	2.3	2.8	127.8	155.6
Chicken eggs	1.5	2.0	2.7	3.9	180.0	260.0
Duck eggs	2.0	2.1	2.6	3.3	130.0	165.0
Bananas	2/ 20.1	10.0	10.5	11.0	52.2	54.7
Pineapples	8.2	7.6	8.4	9.9	102.4	120.7
Oranges	10.2	11.7	14.4	17.2	141.2	168.6
Soybeans	38.0	38.8	50.4	65.6	132.6	172.6
Peanuts	4.8	5.8	6.0	6.4	125.0	133.3
Rapeseed oil	1.4	0.6	0.4	0.2	28.6	14.3
Asparagus	0.5	0.5	0.5	0.5	100.0	100.0
Mushrooms	0.7	0.6	0.6	0.7	85.7	100.0
Onions	0.7	1.1	1.2	1.3	171.4	185.7
Tobacco	3/1,157	3/ 1,186	3/ 1,353	3/ 1,563	116.9	135.1
Cotton	2.6	2.7	2.8	3.0	107.7	115.4

1/ Refers to 1967 figure. 2/ The apparent consumption for 1968 was unusually high because overproduction resulted in sizeable waste. 3/ Refers to pieces of cigarettes.

Source: Taiwan-Long-term Projections Study.

Table 5.--Taiwan: Projected consumption of selected farm products for 1975 and 1980 (With 1968 and 1970 data and select indices for comparison) 1/

Commodities	1968	1970	1975	1980	1970	1975	1980
	1,000 metric tons				Index: (1968=100)		
Rice (brown)	2,218	2,304	2,506	2,700	103.9	113.0	121.7
Sugar	173	180	232	297	104.0	134.1	171.7
(Wheat flour)	302	331	404	485	109.6	133.8	160.6
Wheat	409	447	546	655	109.3	133.5	160.1
Sweetpotatoes	3,720	3,830	4,254	4,676	103.0	114.4	125.7
Corn	396	529	906	1,224	158.8	228.8	309.1
Pork	321	342	436	553	106.5	135.8	172.3
Milk products	100	116	193	318	116.0	193.0	318.0
Tallow	23	20	20	19	87.0	87.0	82.6
Chicken meat	45	50	72	101	111.1	160.0	224.4
Duck meat	24	26	36	50	108.3	150.0	208.3
Chicken eggs	20	28	43	68	140.0	215.0	340.0
Duck eggs	28	40	41	57	142.8	146.4	203.6
Bananas	274	143	167	192	52.2	60.9	70.1
Pineapples	112	109	134	154	97.3	119.6	137.5
Oranges	139	167	228	300	120.1	164.0	215.8
Soybeans	524	560	807	1,151	106.9	154.0	219.6
Peanuts	74	92	105	121	124.3	141.9	163.5
Rapeseed oil	19	8	6	4	42.1	31.6	21.1
Asparagus	6	7	8	9	116.7	133.3	150.0
Mushrooms	9	9	10	12	100.0	111.1	133.3
Onions	10	16	20	24	160.0	200.0	240.0
Tobacco	18	19	24	31	105.6	133.3	172.2
Cotton	36	38	44	51	105.6	122.2	141.7

1/ Projections were derived in terms of wheat, and converted to wheat equivalent by multiplying the wheat volume by the coefficient 1/74.

Source: Derived from Taiwan Long-term Projections Study.

Production

Agricultural production is expected to expand continuously but at rates below previous periods. In its 10-year economic development plan, the Government has set a target growth rate of around 4 percent per annum, although a higher annual growth of 5 to 6 percent occurred in the previous period. This implies that further expansion in production will have to rely heavily on increases in yield per unit of land.

Production of food grains is projected to increase only moderately. Sweetpotato production is shown to increase steadily. Production of pork, milk products, eggs, and poultry meats is projected to increase much more rapidly than that of other products. The increase in sugar production is expected to be limited by the difficulty of securing additional land, but increasing yields per hectare through technical innovations will increase production slightly. A relatively larger expansion is foreseen for oranges than for pineapples and bananas. Vegetable production is expected to continue to increase. With the exception of peanuts, a slow rise in production of oilseed crops is expected.

By 1980, tobacco production should be about 45 percent above the 1968 level. However, the domestic supply of high-grade tobacco leaf will still be insufficient to meet domestic consumption (table 6).

Trade

Taiwan is a substantial exporter of agricultural commodities in the Far East. However, its favorable export balance is projected to weaken during the 1970's because of limited land area and continuous increases in domestic consumption. Total agricultural import requirements are projected to increase greatly beyond 1968 levels. Nevertheless, within the agricultural sector, future export expansion is expected to continue to maintain a favorable balance over imports, aiding further economic development.

Table 6.--Taiwan: Projected production of selected farm products for 1975 and 1980 (With 1968 and 1970 data and select indices for comparison)

Commodities	1968	1970	1975	1980	1970	1975	1980
	1,000 metric tons				Index: (1968=100)		
Rice (brown)	2,518	2,552	2,652	2,757	101.4	105.3	109.5
Sugar	865	832	865	900	96.2	100.0	104.0
Wheat	17	16	15	13	94.1	88.2	76.5
Sweetpotatoes	3,720	3,830	4,254	4,676	103.0	114.4	125.7
Corn	52	56	66	76	107.7	126.9	146.2
Pork	323	352	495	675	109.0	153.2	209.0
Milk products	15	24	55	127	160.0	366.7	846.7
Chicken meat	45	50	72	101	111.1	160.0	224.4
Duck meat	24	26	36	50	108.3	150.0	208.3
Chicken eggs	22	31	47	74	140.9	213.6	336.4
Duck eggs	30	32	44	60	106.7	146.7	200.0
Bananas	646	583	695	782	90.2	107.6	121.9
Pineapples	311	306	362	418	98.4	116.4	134.4
Oranges	176	187	250	323	106.2	142.0	183.5
Soybeans	73	72	77	80	98.6	105.5	109.6
Peanuts	74	89	101	111	120.3	136.5	150.0
Rapeseed oil	1	1	2	2	100.0	200.0	200.0
Asparagus	52	55	68	80	105.8	130.8	153.8
Mushrooms	53	56	66	73	105.7	124.5	137.7
Onions	26	33	44	55	126.9	169.2	211.5
Tobacco	21	22	26	30	104.8	123.8	142.8
Cotton	1	1	1	1	100.0	100.0	100.0

Source: Derived from Taiwan Long-term Projections Study.

It is projected that Taiwan will continue to export the traditional products, although relative levels and composition of future exports may change (table 7). Rice exports are projected to fall substantially by 1980, equalling only 19 percent of the high 1968 level.

Table 7.--Taiwan: Projected trade of selected agricultural products for 1975 and 1980 (With 1968 and 1970 trade data for comparison) 1/

Commodities	1968	1970	1975	1980
	1,000 metric tons			
Imports:				
Corn	351.0	572.4	839.3	1,148.0
Soybeans	385.0	488.4	729.9	1,071.4
Wheat	448.8	431.1	531.3	641.9
Cotton 2/	87.0	94.4	103.7	114.1
(Cotton)	(54.0)	(56.9)	(59.8)	(63.4)
Milk products	85.0	92.2	137.9	190.4
Tallow	22.7	20.1	19.8	18.6
Rapeseed oil	48.2	6.9	4.1	2.1
Peanuts	0.1	3.3	4.5	10.9
Tobacco 3/	1.6	2.0	3.6	4.6
(Tobacco)	(2.9)	(5.8)	(5.1)	(3.7)
Exports:				
Sugar	629.0	651.6	633.3	602.7
Bananas	340.6	439.7	528.1	589.6
Rice (brown)	68.0	248.7	146.1	56.4
Pineapples 4/	186.6	197.2	228.7	263.3
Asparagus	42.7	48.0	59.8	71.1
Mushrooms	41.0	47.6	55.3	61.1
Oranges	20.7	20.3	21.7	23.3
Onions	15.5	16.8	24.1	30.8
Pork	.7	8.0	48.3	100.2
Chicken eggs	--	2.6	3.9	5.7
Duck eggs	.4	1.8	2.6	3.4

1/ Trade figures may not equal differences between production and demand due to rounding. Brown rice is converted to milled by utilizing a 0.93 coefficient. Although 1968 data have been revised as more current data is received, 1970 data are projections.

2/ Cotton imports represent the total demand for imports (domestic plus exports). Data in parenthesis represent the share of imported cotton utilized for exported cotton products. Trade (1 ton) converted to cotton equivalent (1 ton) on the basis of the following: cotton yarn multiplied by 1.1150; cotton piece goods by 1.1485; manufactured cotton goods by 1.2059.

3/ Demand for tobacco was derived by converting total pieces of cigarettes into tobacco equivalent on the basis of 1 cigarette piece = 1.14 grams of tobacco. Figures in parenthesis equal exports. The difference between exports and imports equals the gap between total supply and domestic.

4/ Includes fresh and canned in terms of fresh equivalent.

Sugar exports, the traditionally big foreign exchange earner, are projected to level off during the late 1970's, falling slightly below levels achieved during the 1960's. Commodities for which export quantities are projected to increase include bananas, pineapples, oranges, asparagus, mushrooms, onions, pork, eggs, and cotton goods. The export growth rate of onions, eggs, and pork is expected to grow most rapidly.

On the import side, Taiwan is projected to experience a strong uptrend in imports of wheat, animal feeds (corn and soybeans), milk products, and cotton. In terms of base period (1968) levels, 1980 imports are projected to show an increase of 43 percent for wheat, 234 percent for corn, 138 percent for soybeans, 124 percent for milk products, and 28 percent for cotton. Also reexports of cotton, in terms of cotton products, are expected to increase substantially over the projected period. Imports of high-grade tobacco will increase substantially. Exports of some low-grade tobacco are expected to continue. Exports of tobacco, in terms of manufactured products, are shown to decrease continuously over the projected period. Peanuts, which were supplied domestically self-sufficient in the past, will become an import commodity. Tallow imports will gradually decrease.

IMPLICATIONS FOR FUTURE U.S.-TAIWAN TRADE

Taiwan's rapid economic growth has been accompanied by significant changes in the composition and direction as well as in the absolute levels of its trade flows. This is especially true for its agricultural trade in which the United States has had a dominant role. In recent years, however, the U.S. role has diminished as Taiwan as Taiwan has tended toward diversifying its trade patterns and partners. To retain this important market, the United States will need to intensify its trade efforts, adjusting to the dynamic needs of a rapidly developing country.

Taiwan's Changing Trade Posture

External trade--increasingly significant in the country's economic development--has expanded rapidly, rising from $328 million annually during the 1954-56 period to nearly $1.9 billion in 1968 (table 8). Although the value of imports increased nearly fivefold during the same period, the value of exports rose about sevenfold, narrowing the import-export gap from the 1954-56 average of about 27 percentage points to less than 10 by 1968.

The rapid changes in composition of both exports and imports are as significant as the expansion in absolute trade levels. For instance, while total exports increased by some $721 million over the 1954-56 to 1968 period, industrial products, as a share of total exports, rose from 9.7 to over 66 percent (table 9). The share of agricultural exports (agricultural and processed agricultural products) dropped from over 90 to less than 35 percent. Over the same period, however, the total value of agricultural exports rose 160 percent to a 1968 level of $283 million, reflecting a substantial rise in the absolute level despite the decline in relative importance.

Reflecting the rapid rise in industrial exports, the capital goods portion of total imports has risen from an average of slightly over $43 million in 1954-56 to nearly $362 million in 1968 (table 10). As a share of total imports, capital goods imports rose from 21 to over 35 percent during the same period. While both agricultural and industrial raw materials and consumption goods dropped in relative importance, they rose substantially in absolute value.

Table 8.--Taiwan: Value of Taiwan's total trade, imports and exports for select averages and years
(With percentages and indices for comparison)

	Total trade			Imports			Exports		
	$1,000	(Percent)	(Index) 2/	$1,000	(Percent)	(Index) 2/	$1,000	(Percent)	(Index) 2/
1954-56 average	327,841	100.0	100.0	207,422	63.3	100.0	120,419	36.7	100.0
1959-61 average	457,892	100.0	140.0	273,539	59.7	131.9	184,353	40.3	153.1
1964-66 average	1,045,449	100.0	318.9	1/ 522,276	50.0	251.8	523,173	50.0	434.5
1967	1,522,590	100.0	466.4	847,497	55.7	408.6	675,093	44.3	560.6
1968	1,867,637	100.0	572.0	1,025,862	54.9	495.6	841,755	45.1	699.0

1/ Total imports exclude bank's exchange settlement, U.S. Aid, etc., and therefore do not equal imports shown on table 10.
2/ 1954-56 average = 100.

Source: Computed from Taiwan Long-term Projections Study.

Table 9.--Taiwan: Total exports and export composition for select averages and years
(With percentages and indices for comparison)

	Total			Agricultural products			Processed agricultural products			Industrial products		
	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/
1954-56 average	120,419	100.0	100.0	24,304	20.2	100.0	84,390	70.1	100.0	11,725	9.7	100.0
1959-61 average	184,353	100.0	153.1	29,108	15.8	119.8	92,391	50.1	109.5	62,853	34.1	536.1
1964-66 average	523,173	100.0	434.5	105,648	20.2	434.7	165,829	31.7	196.5	251,696	48.1	2,146.7
1967	675,093	100.0	560.6	121,298	18.0	499.1	148,457	22.0	175.9	405,338	60.0	3,457.0
1968	841,775	100.0	699.0	109,261	13.0	449.6	173,365	20.6	205.4	559,149	66.4	4,768.9

1/ 1954-56 average = 100.

Source: Computed from Taiwan Long-term Projections Study.

Table 10.--Taiwan: Total imports and import composition for select averages and years
(With percentages and indices for comparison) 1/

	Total imports			Capital goods			Agricultural and industrial raw materials			Consumption goods		
	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/	$1,000	(Percent)	(Index) 1/
1954-56 average	207,422	100.0	100.0	43,264	20.8	100.0	143,815	69.4	100.0	20,343	9.8	100.0
1959-61 average	273,538	100.0	131.9	79,140	28.9	182.9	167,327	61.2	116.3	27,071	9.9	133.1
1964-66 average	523,304	100.0	252.3	138,412	28.4	819.9	330,050	63.0	229.8	44,842	8.6	220.4
1967	847,496	100.0	408.6	318,835	37.6	737.0	467,138	55.1	324.8	61,523	7.3	302.4
1968	1,025,862	100.0	494.6	361,730	35.2	836.1	588,606	57.4	409.3	75,526	7.4	371.3

1/ 1954-56 average = 100.

Source: Computed from Taiwan Long-term Projections Study.

Trends in Total U.S.-Taiwan Trade

The rapid economic development of Taiwan's economy and the resulting increase in the value and composition of external trade present significant implications for its trade--overall as well as agriculture--with the U.S. Over the period 1956-68, the U.S. share of Taiwan's total external trade rose from 25 to over 31 percent, representing a value increase of some $454 million. But of even greater significance for future U.S. trade with Taiwan, the U.S. share of imports and exports altered substantially (table 11). Japan accounted for 35.5 percent of Taiwan's exports and 34.7 percent of its imports in 1956, while the United States accounted for less than 5 percent of the exports but 37 percent of the imports. By 1968, the United States had replaced Japan as Taiwan's leading export customer, accounting for over 30 percent of its exports. During the same period, the United States lost its export position to Japan which furnished over 41 percent of the island's total imports, compared with less than 30 percent attributable to U.S. trade.

Trends in U.S.-Taiwan Agricultural Trade

Since 1962-63, U.S. agricultural trade with Taiwan has had sizable value gains in exports and imports. Compared with the 1962-63 average, the U.S. value share of Taiwan's imports and exports increased 45 and 67 percent, respectively, by 1969, representing an increase of $33.3 million in U.S. exports and $16.6 million in U.S. imports (table 12). However, the U.S. percentage share of Taiwan's agricultural imports has significantly weakened, dropping from over 70 percent for the 1962-63 average to 39 percent in 1969. Its percentage share of Taiwan's agricultural exports in 1969 ranged near the 1962-63 level of 17 percent. Thus, the U.S.' position as Taiwan's strong agricultural trading partner has weakened as Taiwan diversified its trade composition and flow patterns. This is especially true of Taiwan's imports of U.S. cereals, cotton, dairy products, and eggs,--for which the U.S. percentage shares declined significantly during the 1960's. Although the U.S. share of Taiwan's agricultural exports has strengthened significantly over the 1962-63 level, its percentage of total Taiwan agricultural exports has fallen from 25 to 16 percent. This is especially true for fruits and vegetables and to a lesser degree for sugar. However, while the predominant U.S. role in Taiwan's agricultural trade has weakened, the U.S. agricultural trade balance with Taiwan has remained favorable, representing $49 million for 1962-63 and exceeding $70 million for the 1968-69 average.

Implications for Selected U.S. Agricultural Exports

Cereals (mostly wheat and corn), oilseeds (chiefly soybeans), natural fibers (mostly cotton), and unmanufactured tobacco account for the bulk of U.S. agricultural exports to Taiwan.

U.S. exports of these groups to Taiwan increased from a 1962-63 average of 68 million to $99.2 million in 1969. This was about 93 percent of total U.S. exports of foods, beverages, and agricultural raw materials to the island. Since the 1962-63 average, the U.S. value and percentage share of Taiwan's imports of cereals and natural fibers has generally weakened, but the value share of oilseed and tobacco trade has greatly increased.

Projections for 1975 and 1980 indicate that Taiwan's import requirement for these commodities will experience significant growth. Although the United States is expected to continue to account for a major share of the projected import growth, its percentage share is expected to drop because of Taiwan's tendency to diversify foreign trade and increasing competition from other world areas.

Table 11.-Taiwan: Percentage of total exports and imports by country of destination (origin) for selected years

	1956	1960	1964	1966	1967	1968
	Percent					
Exports						
United States	4.8	12.5	18.1	19.7	22.7	30.9
Japan	35.5	37.4	30.2	24.9	19.5	18.2
Hong Kong	7.2	11.5	7.2	5.9	7.4	8.6
West Germany	1.8	2.3	3.9	5.5	6.2	6.4
Thailand	1.7	2.2	3.4	3.1	4.0	3.4
Singapore & Malaya	8.1	5.2	4.1	2.4	3.5	4.4
Korea, Rep. of	5.3	4.2	1.4	2.2	3.1	1.9
Other	35.6	24.7	31.7	36.3	33.6	26.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Imports						
Japan	34.7	34.6	34.2	38.3	35.8	41.3
United States	37.0	40.8	34.1	31.8	34.3	29.8
West Germany	2.9	4.5	3.5	4.2	3.3	3.5
Australia	0.8	1.3	2.3	3.2	3.1	2.4
United Kingdom	2.7	1.6	2.4	1.6	2.0	2.0
Philippines	0.8	1.0	2.5	2.4	1.7	1.6
Hong Kong	1.4	2.0	1.6	1.6	1.5	1.6
Other	19.7	14.2	19.4	16.9	18.3	17.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Computed from Taiwan Long-term Projections Study.

Table 12.--Taiwan: Imports and exports of specified products for selected periods
(With U.S. exports and imports from Taiwan for comparison) 1/

	1962/63 average			1964			1965			1966			1967			1968			1969		
	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share	2/ Total	3/ U.S.	4/ U.S. Share
	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent
Food (including feed)																					
Live animals	0.2	--	--	0.1	0.1	100.0	0.5	0.1	20.0	0.2	0.1	50.0	0.3	0.2	66.7	0.5	0.3	60.0	0.5	0.5	100.0
Meat	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	0.1	--	--
Dairy products and eggs	3.9	1.0	25.6	5.0	1.2	24.0	5.1	1.7	33.3	6.5	1.0	15.4	7.2	1.7	23.6	8.7	0.9	10.4	10.8	0.1	0.9
Cereals	26.2	25.0	95.2	29.8	19.8	66.4	34.3	24.4	71.1	26.2	19.5	74.4	33.9	28.7	84.7	56.5	26.9	47.6	75.5	22.1	29.3
Fruits and vegetables	1.8	0.1	5.6	3.8	0.5	13.2	3.7	0.2	5.4	5.2	0.6	11.5	4.1	0.9	22.0	4.9	0.9	18.4	5.7	1.5	26.3
Sugar	--	--	--	--	--	--	0.1	--	--	0.1	--	--	0.1	--	--	0.1	--	--	0.1	--	--
Coffee, cocoa, tea, spices	0.2	--	--	0.3	--	--	0.4	0.1	25.0	0.4	0.1	25.0	0.5	0.1	20.0	0.8	0.1	12.5	0.7	0.1	14.3
Animal feed	0.6	--	--	0.7	--	--	0.9	0.1	11.1	2.6	0.1	3.8	5.7	--	--	5.5	--	--	8.6	0.2	2.3
Misc. food preparation	0.2	0.3	150.0	0.4	0.6	150.0	0.3	0.4	133.3	0.2	0.3	150.0	0.3	0.5	166.7	0.4	0.5	125.0	0.3	0.4	133.3
Beverages	0.1	--	--	0.1	--	--	0.1	--	--	0.1	--	--	0.4	--	--	1.5	0.1	6.7	0.4	--	--
Agricultural raw materials																					
Unmanufactured tobacco	3.5	2.8	81.4	2.3	1.6	69.6	3.5	3.9	111.4	4.5	5.4	120.0	11.1	6.3	56.8	1.7	6.0	353.0	3.7	8.9	240.5
Hides and skins	1.2	0.4	33.3	1.5	0.5	33.3	1.9	0.3	15.8	2.0	0.3	15.0	2.3	0.8	34.8	2.3	1.2	52.2	3.5	1.6	45.7
Oilseeds	13.6	11.6	85.7	23.9	21.2	88.7	20.0	17.6	88.0	21.4	15.0	70.1	45.6	37.9	83.1	50.8	39.0	76.8	56.0	46.8	83.6
Natural rubber	3.1	--	--	3.2	--	--	3.4	--	--	4.3	0.1	2.3	4.8	--	--	5.1	--	--	8.0	--	--
Natural fibers	42.6	28.6	67.1	42.1	25.0	59.4	48.7	20.3	41.7	49.6	28.6	57.7	54.6	28.5	52.2	56.3	37.1	65.9	93.4	21.4	22.9
Crude materials	3.2	0.2	6.3	3.3	0.2	6.1	3.8	0.2	5.3	4.0	0.2	5.0	5.3	0.2	3.8	5.5	0.3	5.5	5.5	0.2	3.6
Oils and fats	4.6	3.6	79.3	8.2	6.8	82.9	5.7	4.8	84.2	5.4	4.9	90.7	7.0	5.5	78.6	3.5	3.3	94.3	4.8	0.3	66.7
Total	105.0	73.8	70.3	124.9	77.5	62.0	132.3	74.3	56.2	132.7	76.0	57.4	183.4	111.3	60.7	203.9	116.7	57.2	277.6	107.1	38.6

Table 12.--Taiwan: Imports and exports of specified products for selected periods--Continued
(With U.S. exports and imports from Taiwan for comparison)

	1962/63 average			1964			1965			1966			1967			1968			1969		
	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share	5/ Total	6/ U.S.	7/ U.S. Share
	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent	Million Dol.		Percent
Food (including feed)																					
Live animals	1.1	--	--	0.3	--	--	0.2	--	--	0.2	0.1	50.0	0.6	0.1	16.7	0.4	--	--	0.6	--	--
Meat	0.1	--	--	--	--	--	--	--	--	0.2	--	--	0.3	--	--	2.0	0.1	5.0	8.0	--	--
Dairy products and eggs	0.2	0.1	50.0	0.1	0.1	100.0	0.2	0.1	50.0	0.2	0.2	100.0	0.3	0.2	66.7	0.3	0.2	66.5	0.4	0.2	50.0
Cereals	12.9	--	--	22.9	--	--	44.0	--	--	30.9	--	--	21.1	0.1	0.5	13.5	0.1	0.7	6.5	0.1	1.5
Fruits and vegetables	40.2	10.4	26.0	72.7	13.0	17.9	113.7	18.0	15.8	123.5	18.5	15.0	150.5	23.0	15.3	152.6	25.0	16.4	165.5	25.8	15.6
Sugar	74.6	10.3	14.0	130.0	9.7	7.5	60.6	7.3	12.0	55.0	6.8	12.4	41.7	13.3	31.9	47.5	11.4	25.1	47.6	10.9	22.9
Coffee, cocoa, tea, spices	7.5	1.8	23.3	8.0	1.8	22.5	8.8	1.9	21.6	10.0	1.9	19.0	10.8	1.7	15.7	11.3	1.8	15.9	13.0	1.4	10.8
Animal feed	--	--	--	0.1	--	--	0.4	--	--	0.1	--	--	0.1	--	--	0.6	--	--	0.2	--	--
Misc. food preparation	3.2	--	--	5.7	--	--	3.6	--	--	2.9	0.1	--	2.2	0.1	4.5	1.7	0.1	5.9	2.9	0.1	--
Beverages	0.1	--	--	0.2	--	--	0.2	--	--	0.2	--	--	0.2	--	--	0.2	--	--	0.3	--	--
Agricultural raw materials																					
Unmanufactured tobacco	1.4	--	--	1.0	--	--	1.8	--	--	2.9	--	--	1.4	--	--	1.8	--	--	1.8	--	--
Hides and skins	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oilseeds	0.1	--	--	0.1	--	--	0.1	--	--	0.1	--	--	0.2	--	--	0.2	0.1	50.0	0.5	0.1	20.0
Natural rubber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Natural fibers	0.8	--	--	0.9	--	--	1.3	0.2	15.4	2.7	0.4	14.8	1.5	0.1	6.7	2.5	0.1	4.0	5.8	--	--
Crude materials	3.6	2.2	61.1	4.6	3.1	67.4	4.0	2.7	67.5	4.7	2.7	57.4	5.3	2.6	49.1	6.5	3.1	47.7	6.5	2.7	41.5
Oils and fats	0.3	--	--	0.3	--	--	0.7	--	--	0.3	--	--	0.2	--	--	0.1	--	--	--	--	--
Totals	145.8	24.8	17.0	246.4	27.8	11.3	239.6	30.2	12.6	233.8	30.6	13.1	236.6	41.2	17.4	241.4	42.0	17.4	259.9	41.4	15.9

1/ Columns may not add due to rounding. The U.S. share may exceed the Taiwan level for certain years and commodities.
2/ Taiwan imports. 3/ U.S. exports to Taiwan. 4/ Percent U.S. exports are of Taiwan imports.
5/ Taiwan exports. 6/ U.S. imports from Taiwan. 7/ Percent U.S. imports are of Taiwan exports.

Source: Compiled from "The 1969 Agricultural Data Book for the Far East and Oceania," utilizing official U.S. and Taiwan trade sources for latest data.

Wheat

Wheat production in Taiwan has been negligible due to unfavorable climatic conditions. Production reached its peak level of 46,000 tons in 1960. As a result of a rapid decline during the ensuing years, production accounted for less than 5 percent of total supplies in 1968.

The United States has accounted for the bulk of Taiwan's wheat imports since 1955. Since the mid-1960's, however, other countries--Australia, Canada, and Argentina--have been providing greater competition. This competitiveness is expected to increase during the 1970's, limiting the U.S. share to 85-95 percent. On this basis, U.S. wheat exports to Taiwan are estimated to range from a low of 450,000 to over 500,000 tons in 1975 and could exceed 600,000 tons by 1980, providing the United States remains competitive and rice does not become a significant substitute for wheat. Wheat flour imports will not be significant over the projected period.

Table 13.--Taiwan: Wheat imports with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	174.9	238.2	321.2	531.3	641.9
From United States (1,000 metric tons)	174.9	236.2	271.6	504.7 451.6	609.8 545.6
U.S. share (percent)	100.0	99.0	85.0	95.0 85.0	

1/ Percentages and totals may not agree due to rounding.

Source: Computed from Taiwan Long-term Projections Study and related data.

Corn

Corn production is quite limited. Although production increased under protective tariffs, its share of total supply was less than 14 percent in 1968. With the removal of protective tariffs in 1967, the area planted to corn declined. Demand for corn has more than tripled since 1965. Only modest increases have occurred in human consumption. However, demand for feed increased from less than 80,000 tons in 1965 to nearly 365,000 tons in 1968, reflecting rapid increases in swine and poultry enterprises.

Taiwan has increased corn imports rapidly since the mid-1960's. The United States accounted for 0 to 100 percent of Taiwan's negligible imports over the 1955-66 period, but has failed to acquire a significant share of Taiwan's greatly expanded market. Thailand continues to be the main source of corn imports.

Corn imports are projected to rise from a 1964-66 average of slightly over 45,000 tons to over a million tons by 1980. Although continued export competition will most likely keep the U.S. share at or below the 20-percent level, U.S. corn exports to Taiwan are expected to rise substantially. Should Taiwan's 1975-80 corn imports approximate the projected level, the U.S. share could rise significantly above the 20-percent level--especially if Thailand and certain Latin American countries fail to remain competitive with the United States.

Table 14.--Taiwan: Corn imports, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	5.7	10.3	45.1	839.3	1,148.0
From United States (1,000 metric tons)	--	0.2	12.5	168.0 126.0	230.0 172.0
U.S. share (percent)	0.0	1.6	27.7	20.0 15.0	

1/ Percentages and totals may not agree due to rounding.
Source: Computed from Taiwan Long-term Projections Study and related data.

Soybeans

Soybeans are a traditional crop in Taiwan, raised mostly as a winter crop in the southern part of the island. Although production has increased substantially since 1960, the planted area has declined. With production lagging behind increased consumption, imports have filled the rapidly rising gap.

On a tonnage basis, Taiwan's projected imports of soybeans approximate those for corn. Imports, which have risen significantly since the early 1960's, are projected to exceed 700,000 tons by 1975, advancing to over a million tons by 1980.

Over the years the United States has accounted for nearly 100 percent of this growing market, dropping slightly below 95 percent in only 2 years since 1955. It is unlikely that the U.S. share will fall significantly below the 95-percent level during the 1970's; most probably it will be near the 100-percent mark. If this is true, U.S. soybean exports to Taiwan should exceed 700,000 tons by 1975 and approximate a million tons by 1980. Unexpected competition from other oilseeds and/or changes in Taiwan-Mainland China relationships could reduce the U.S. share of total oilseed imports. Also, Taiwan's total import projections may be low, giving a downward bias to the potential import market for this commodity.

Table 15.--Taiwan: Soybean imports, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	103.9	126.6	169.[illegible]	729.9	1,071.4
From United States (1,000 metric tons)	103.9	126.1	168.[illegible]	693.4 729.9	1,017.[illegible] 1,071.[illegible]
U.S. share (percent)	100.0	99.6	99.4	95.0 100.0	

1/ Percentages and totals may not agree due to rounding.
Source: Computed from Taiwan Long-term Projections Study and related data.

Cotton

Less than 1 percent of Taiwan's cotton supply is domestically grown. Climatic conditions are not favorable and planted area has declined sharply since 1960. However, significant yield increases have stablized production at a level somewhat less than 1,000 tons per year.

Cotton imports have risen significantly since 1955, and in 1968 exceeded 87,000 metric tons, more than double the 1960 level. Cotton imports are projected to approximate 104,000 metric tons in 1975 and to exceed 114,000 by 1980.

Prior to the mid-1960's, the U.S. share of Taiwan's growing cotton import market ranged between 95 and 100 percent. Since 1963, however, the U.S. share has declined to an annual average of less than 75 percent, losing ground to increasing competition from Latin American countries. If U.S. cotton remains competitive, its share of the Taiwan import market is expected to range between 65 and 80 percent. Under these assumptions, imports of U.S. cotton are projected to range between 67,000 and 83,000 tons by 1975 and between 74,000 and 91,000 by 1980. If foreign demand for Taiwan's exports of cotton products weakens, Taiwan may fail to attain projected import levels, thereby lowering the U.S. volume share.

Table 16.--Taiwan: Cotton imports, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	27.6	39.2	63.2	103.7	114.1
From United States (1,000 metric tons)	26.4	38.2	43.2	83.0 67.4	91.3 74.2
U.S. share (percent)	95.6	97.4	68.4	80.0 65.0	

1/ Percentages and totals may not agree due to rounding.

Source: Computed from Taiwan Long-term Projections Study and related data.

Tobacco

Taiwan's soils and climatic conditions yield a low-quality tobacco. High-quality tobacco is imported to upgrade domestic tobacco products. Surplus domestic tobacco is exported, increasing from negligible amounts in the 1950's to nearly 3,000 tons in 1968. Tobacco imports have generally ranged below 1,500 metric tons, but began to swing upward in the early 1960's, averaging above 2,000 tons since 1965. The tendency for both increasing exports (low-grade, surplus tobacco) and imports (high-grade tobacco) reflects growing domestic preference for high-grade cigarettes.

With the advent of significantly increased imports, the U.S. share dropped from nearly 100 percent during the 1950's to less than 80 percent during the latter part of the 1960's. New import sources have varied greatly among countries, with South Africa and South Korea accounting for a large share in 1965 and 1968, respectively.

The United States is expected to retain 70 to 85 percent of Taiwan's import market over the 1975-80 period. In this case, U.S. exports should range between 2,500 and 3,000 metric tons by 1975 and between 3,200 and 3,900 metric tons by 1980.

Table 17.--Taiwan: Tobacco imports, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (metric tons)	1,035	1,398	1,759	3,600	4,600
From United States (metric tons)	1,031	1,365	1,456	3,060 2,520	3,910 3,220
U.S. share (percent)	99.6	97.6	82.8	85.0 70.0	

1/ Percentages and totals may not agree due to rounding.

Source: Computed from Taiwan Long-term Projections Study and related data.

Dairy Products 2/

Since 1955, when Government action initiated growth in Taiwan's dairy industry, both cow numbers and yields per cow increased rapidly, resulting in nearly an eightfold increase in fresh milk production by 1968. However, production expansion has been limited by the lack of land for economic production of feed grains. As a result, imports of milk products have grown at increasingly rapid rates, accounting for over 85 percent of total consumption in 1968. During the 1970's, domestic milk production is projected to increase some 400 percent, or about 40 percent of the projected 1980 demand.

Prior to 1960, Taiwan's imports of dairy products generally ranged below 15,000 metric tons and consisted of mostly powdered, condensed, and evaporated milk. Beginning in 1960, total imports experienced rapid annual increases, more than tripling by 1965. By 1968, imports had nearly doubled their 1965 level, approximating 85,000 metric tons. Most of the increase was attributed to greater imports of powdered milk, which constituted nearly 90 percent of total imports of dairy products in 1968 (value basis).

During the early 1950's, the United States accounted for a substantial share of Taiwan's imports of dairy products; about 30 percent of condensed milk and nearly 50 percent of powdered milk imports (1952-54 average, value basis). Taiwan's imports of butter and cheese were relatively small during this period. However, during the ensuing years imports of powdered milk, butter, and cheese have shown substantial gains. From 1955 to 1968, powdered milk imports increased over eightfold, butter imports about tripled, and cheese increased more than tenfold but remained rather small (238 metric tons). During this period of import growth, however, the U.S. share of Taiwan's total imports of dairy products fell below 5 percent, to the advantage of Europe and, in the case of powdered milk, of Japan and Australia.

2/ Data discussed in terms of fresh-milk equivalent unless otherwise stated. See table 18, footnote 1/.

Although projections show domestic production of fresh milk rising faster than the current annual rate of about 3 percent, future import requirements, in terms of fresh-milk equivalent, will rise substantially (most of the domestically produced fresh milk is directly consumed). Imports are projected to reach a 1975 level of 138,000 metric tons, some 60 percent over the 1968 level. By 1980, imports are shown to exceed 190,000 metric tons, an increase of nearly 40 percent in 5 years. Although total imports of butter and cheese are projected to increase significantly, the actual volume increase is less than 20,000 metric tons, rising from about 6,500 tons in 1968 to slightly over 26,000 tons in 1980. The bulk of the increased import requirement will be attributable to imports of powdered, condensed, and evaporated milk--shown to reach 155,000 tons by 1975 and to exceed 260,000 tons by 1980, some 300 percent over the 1968 level.

Although accounting for over 84 percent of total imports of dairy products during 1955-57, the U.S. share declined progressively during the 1960's, accounting for less than 2 percent in 1968. Since the rapid decline of U.S. AID exports in the late 1950's, imports of powdered milk have come from Europe, Australia, and Japan. Europe in 1968 accounted for about 90 and 95 percent of Taiwan's imports of evaporated and condensed milk, respectively.

Under present conditions the United States can not expect to account for more than a negligible part, if any, of Taiwan's projected imports of dairy products.

Table 18.--Taiwan: Imports of milk products, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	12.3	17.9	49.9	138.0	190.0
From United States (1,000 metric tons)	10.4	1.7	5.7	2/	2/
U.S. share (percent)	84.6	9.5	11.4	2/	

1/ All data in fresh-milk equivalent using the following fresh-milk equivalent ratios: butter, 1:20; cheese, 1:9.5; powdered milk, 1:8; and condensed and evaporated, 1:2.2. Totals and percentages may not agree due to rounding.
2/ Negligible.

Source: Computed from Taiwan Long-term Projections Study and related data.

Tallow

Because domestic production is negligible, most of the tallow requirement is imported. These imports are limited to use in the soap-manufacturing industry. Other tallow-using industries have not emerged.

Imports remained rather constant during the latter part of the 1950's but nearly doubled between 1960 and 1964, increasing further to 23,000 tons by 1968. The United States accounted for approximately 100 percent of these imports.

Future imports are projected to decline somewhat because of the increasing substitution of detergents for laundry soap. However, the United States is expected to continue to account for almost 100 percent of the future imported volume. On the basis of Taiwan's projected imports, U.S. tallow exports to Taiwan are shown to approximate 20,000 tons for 1975, dropping to a slightly lower level in 1980.

Table 19.--Taiwan: Tallow imports, with U.S. share for selected historical and projected periods

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total imports (1,000 metric tons)	10	12	19	20	19
From United States (1,000 metric tons)	10	12	19	20	19
U.S. share (percent)	100.0	100.0	100.0	100.0	

Source: Computed from Taiwan Long-term Projections Study and related data.

Implications for Select U.S. Agricultural Imports

Fruits (chiefly canned pineapples), vegetables (mostly canned mushrooms), and sugar account for the bulk of U.S. agricultural imports from Taiwan. Total U.S. imports of these groups from Taiwan approximated $36.7 million in 1969 (table 12). This was about 89 percent of total U.S. imports of foods, beverages, and agricultural raw materials from Taiwan.

Negligible prior to 1960, U.S. imports of fruits and vegetables from Taiwan have increased in absolute volume but dropped substantially in terms of percentage share of total Taiwanese exports. Although projections for 1975 and 1980 indicate that Taiwan's exports of these commodities (except for sugar) will increase substantially, the U.S. percentage share is estimated to drop significantly, primarily because of Taiwan's tendency to diversify its export trade.

Sugar

For two centuries, cultivation of sugarcane and exports of raw sugar have been important enterprises in Taiwan. During the period of Japanese control (1895 through 1945), the sugar industry was greatly expanded to provide exports to Japan. The industry's prosperity was greatly diminished during the war years (1940-45). Over one-half of the factories were destroyed or badly damaged and about 75 percent of the canefields diverted to other crops. After the war, the sugar industry was partially restored, but the arrival of the Chinese from Mainland China in 1949 resulted in sugarcane land being diverted to other crops to meet greatly increased food needs. However, during the 1950's, production again increased, peaking out during the mid-1960's at slightly over the million-ton level. Exports exceeded 850,000 tons in 1966, dropping to lower levels in the ensuing years.

With per capita consumption varying within a narrow range, exports have varied according to fluctuations in production. Exports have been mostly to countries in the Far East. With production projected to show only modest increases while per capita

consumption moves slightly upward, exports are projected to hover above 630,000 tons in 1975, dropping to 600,000 tons by 1980. Under current conditions, U.S. sugar imports could range between 10 and 15 percent of Taiwan's total sugar exports during the 1975-80 period. On this basis, the U.S. import level is expected to range between 60,000 and 95,000 tons.

Table 20.--Taiwan: Exports of sugar, with U.S. share for selected historical and projected periods 1/

	1955-57 average	1959-61 average	1964-66 average	1975	1980
Total exports (1,000 metric tons)	726.3	740.0	823.0	633.3	602.7
To United States (1,000 metric tons)	1.4	54.6	72.8	95.0 63.0	90.0 60.0
U.S. share (percent)	0.2	7.4	8.8	15.0 10.0	

1/ Percentages and totals may not agree due to rounding.

Source: Computed from Taiwan Long-term Projections Study and related data.

Pineapples

For Taiwan production and exports of canned pineapples are a development of the last two decades. As late as 1955, pineapple production was only 71,000 tons and exports of canned pineapple less than 40,000 tons. By 1960, both production and exports had more than doubled 1955 levels. With continually increasing export demand, production reached a 1968 level of over 311,000 tons, about 87 percent over 1960. Exports of canned pineapples approximated 165,000, more than 113 percent over 1960.

The U.S. share of Taiwan's rising exports of canned pineapples was negligible during the 1950's, but spurted to over 20 percent by the early 1960's. During the late 1960's, it averaged over 40 percent.

Projections show Taiwan exporting over 200,000 tons of canned pineapples by 1975, and more than 233,000 tons by 1980. The U.S. share of this is expected to range lower than that shown for the late 1960's because of competition from other sources within the U.S. market, primarily the Philippines.

The U.S. share is most likely to range between 30 and 40 percent for 1975 and between 20 and 30 percent for 1980. Based on Taiwan's projected exports of canned pineapples, U.S. imports could range between 60,000 to 80,000 tons by 1975 and 50,000 to 70,000 tons by 1980.

Table 21.--Taiwan: Exports of canned pineapple, with U.S. share for selected historical and projected periods 1/

	1950-52 average	1964-66 average	1975	1980
Total exports (1,000 metric tons)	91.9	146.5	202.8	233.4
To United States (1,000 metric tons)	22.1	59.1	80.0 60.0	70.0 50.0
U.S. share (percent)	24.0	40.4	40.0 30.0	30.0 20.0

1/ All data in terms of fresh equivalent on its basis of 2 tons of fresh pineapples equaling about 1 ton of canned. Excludes exports of fresh pineapples.

Source: Computed from Taiwan Long-term Projections Study and related data.

Mushrooms 3/

Production and exports of mushrooms were not significant prior to the 1960's. During the 1960's mushroom production increased from a 1961-62 level of 15.7 metric tons to over 52,000 in 1967-68 (fresh basis). Over 85 percent of production is canned, most of which is exported. Exports increased from less than 2,300 tons in 1961 to about 37,000 tons in 1969. Most exports are taken by the United States and West Germany. The U.S. share averaged over 30 percent during the 1960's, rising from about 500 metric tons in 1961 to over 14,000 in 1968.

Since domestic production is greatly influenced by foreign demand projections for this commodity are based on assumptions over which Taiwan has little control. Projections indicate that Taiwan's exports of canned mushrooms will approximate 55,000 by 1975, and exceed 60,000 tons by 1980. Because of rapidly increasing competition from South Korean exports and other new sources of supply as well as increased pressures from U.S. producers, U.S. imports of canned mushrooms from Taiwan are not expected to rise significantly over the 1970-80 period. Therefore, the U.S. share of Taiwan's total mushroom exports will range downward to between 25 and 30 percent for 1975, dropping lower to a range of 20 to 25 percent by 1980. On this basis, U.S. imports of Taiwan mushrooms will probably range between 14,000 and 17,000 tons by 1975, falling to a range of 12,000 to 15,000 tons by 1980. Increasing competition from other exporters and growing import restrictions imposed by importing countries could result in both Taiwan's projected exports and the U.S. share being slightly overstated.

3/ Discussed in terms of canned weight unless otherwise stated.

Table 22.--Taiwan: Exports of canned mushrooms, with U.S. share for selected historical and projected periods 1/

	1961-62 average	1964-66 average	1975	1980
Total exports (1,000 metric tons)	12.1	26.9	55.3	61.0
To United States (1,000 metric tons)	4.4	8.0	16.6 14.0	15.2 12.2
U.S. share (percent)	36.4	29.7	30.0 25.0	25.0 20.0

1/ Historical data in terms of canned weight. Projections in fresh equivalent, the difference being negligible.

Source: Computed from the Trade of China (Yearbook).

Asparagus

Asparagus is a new crop, produced primarily for export. It was first produced (441 tons) in 1963, with production increasing to over 52,000 tons by 1968. Over 90 percent is canned, of which 80 percent is exported.

Although negligible in 1963, exports exceeded 46,000 tons in 1968. European markets provide the major outlet. West Germany is the largest market, accounting for over 85 percent of Taiwan's total exports during 1967-68. The U.S. market usually accounts for less than 2 percent. By 1975, exports are expected to approximate 65,000 tons, increasing to about 77,000 tons by 1980. The U.S. share of Taiwan's projected asparagus exports is not expected to increase significantly above the level indicated for recent years (an average of slightly over 1 percent during the 1965-68 period). In this case, U.S. imports would range below 2,000 tons during the 1975-80 period. Because of Taiwan's favorable production conditions, it has become the world's second largest producer of asparagus, second only to the United States. Unless U.S. asparagus producers provide more effective competition, Taiwan's exports to the United States could greatly exceed the 2,000-ton level.

Table 23.--Taiwan: Exports of canned asparagus, with U.S. share for selected historical and projected periods

	1960-62 average	1964-66 average	1975	1980
Total exports (1,000 metric tons)	1/	11.4	59.8	71.1
To United States (1,000 metric tons)	--	1/	1/	1/
U.S. share (percent)	--	1/	1/	1/

1/ Negligible

Source: Computed from Taiwan Long-term Projections Study and the Trade of China.

Other Commodity Projections

Trade movements of several other agricultural products should be mentioned--despite the lack of significant U.S. involvement. Taiwan rice exports are projected to fall to about 50,000 tons by 1980, providing little, if any, competition for U.S. rice exports. However, exports of poultry and pork products are projected to rise substantially during the 1975-80 period. Although only slightly over 7,000 tons were exported in 1968, exports of pork products are projected to exceed 100,000 tons by 1980. While exports of eggs were negligible in 1968, they are projected to exceed 9,000 tons by 1980. Taiwan's peanut imports are projected to reach 11,000 tons by 1980, compared with negligible amounts in 1968.

APPENDIX I. METHODOLOGY

This discussion of methodology is divided into two sections. The first section deals with the study performed by the National Taiwan University. The second section discusses the approach used by the authors of this report in projecting the U.S. share of the future Taiwan trade.

The National Taiwan University study began with the analysis and projection of population and national income, followed by an analysis of the historical aspects of supply, demand, and trade of the selected agricultural products, and concluded with selected projections for 1970, 1975, and 1980.

Of the two series of population projections published by the Taiwan Population Studies Center, a Government agency specializing in population research, only the series assuming effective family planning was utilized, subject to minor revisions.

Although a 10-equation macroeconomic model was developed for projecting aggregate and per capita national income, the results obtained were considered too optimistic, resulting in unrealistic demand projections. Therefore, the Government's planned growth rate of 7 percent per annum for national income during the Fifth Four-Year Economic Development Plan (1969-72) was adopted and the resulting national income and related data accepted for the 1969-80 period.

Different procedures were utilized for projecting the domestic supply of crops and animal products. For crops, the domestic supply projections were computed by fitting trendlines to historical data and extrapolating to 1980. Many different forms of equations were utilized to represent different area and crop yield trends, but the linear trend equation was most commonly used.

For livestock and poultry products, a projection was made of the most likely numerical level of live units for each of the products. A linear trend was generally employed. Where basic stock numbers increased several times a year, the total number of units produced in a year was obtained by multiplying the total number of units held by farmers at the end of the year by the number of times the total turned over during the year.

Both semi- and double-logarithmic formulas were utilized for projecting domestic demand, taking into account both price and income determinants. When the demand for a product was significantly affected by prices of substitutable products, the price of the principal substitute or the price ratio of the two related products was included in the equation as an additional explanatory variable. For instance, in the demand function for rice, the wheat flour/rice price ratio was included as a variable to

determine the substitution effect of the changes in the relative prices of wheat flour and rice on rice consumption. For the semilogarithmic demand functions, the income (price) elasticities were derived from the general formula, $E_I = \frac{0.43429\ b}{Q_t}$.

From this formula, it is seen that the elasticities derived from the semilogarithmic function decrease as the demanded quantity increases. This is the case for commodities for which the consumption level is near the saturation point. If the estimated coefficient of income was insignificant, or significant but unreasonable from the viewpoint of practical situations, projections were generally made by fitting a trendline to the pertinent series and extrapolating a forecast. Projections of per capita consumption were multiplied by the projected population, giving the quantities of domestic demand for each of the specified products for the years 1970, 1975, and 1980.

For the products consumed in their original form, demand projections were made directly. For those consumed in processed forms, the basic projection was converted into the original form equivalent. For products used as raw material for several final products, projections were made for each of the final products and then converted into their original form equivalents and the aggregate demand obtained.

Methods for projecting exports differ according to the nature of the product, and the provisions under which the product is exported. For some products, such as sugar, export quantities are mainly determined by international agreements which were utilized as the basis for projections. If a product had a predominant export market, such as bananas, the projection of exports was approached by first making projections of the total quantity of demand for the product in the major importing country and then multiplying this quantity by Taiwan's percentage share derived from historical data. If a product was exported to many countries, none of which accounted for an overwhelming quantity of the total import volume, the projections of the exportable quantity were derived by fitting a trendline to time series data and extrapolating into the future. If the exports of a given product represented the residual from matching domestic supply and demand, the projected quantities of exports were simply determined by the surplus-deficit quantities.

For most of the imported products, projections represent the difference between domestic supply of and total demand (including reexports in certain cases) for the products.

Projections of the U.S. share of Taiwan's trade were derived by the authors of this report, utilizing the trade projections of the original study as Taiwan's total trade levels. Owing to the highly fluctuating nature of U.S-Taiwan trade over the decade of the 1960's, the application of conventional methods for projecting the U.S. share of Taiwan's projected trade produced unrealistic results. For certain commodities, U.S.-Taiwan trade was substantial in the early 1960's, but experienced substantial but trend-lacking changes during recent years. For other commodities, particularly Taiwan's exports to the United States, trade was nonexistent in the early 1960's, increased rapidly during the mid-1960's, and peaked out during recent years. Therefore, projections of the U.S. share were derived by analyzing the historical levels, composition, and--when possible--trends, and extrapolating into the future. Where feasible, projected trends in the levels and percentages of U.S. trade with Taiwan were utilized as a guideline. In all cases, the best estimates of the effects of policy and market limitations and potentials, based on the most recent data, were utilized in determining the ultimate projections.

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